COGNITIVE DISSONANCE AND UTILITY MAXIMIZATION
A General Framework*

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Neoclassical theory of utility maximization assumes irrational behavior to be unsystematic and therefore impossible to model. Recent advances in behavioral decision theory suggests irrationality may be systematic. In line with these and earlier findings from the theory of cognitive dissonance, a simple descriptive model of utility maximization is developed with the added feature of an information filter. The model is then used to explain a few 'irrational' micro and macro behaviors.

1. Introduction

The concept of utility maximization in economics is almost as old as economics itself. Since the advent of marginalism, it has withstood attacks by philosophers, psychologists and economists, with little change in its basic tenets. [For a thorough review of the 'history' of utility maximization, see Schoemaker (1982).] Yet in recent years, a growing number of economists have advocated a more behavioral approach to economics, and in so doing, re-opened the debate over the utility maximization framework to new ideas.1

One of the more interesting challenges to the narrow interpretation of utility maximization has grown out of the recent use of the psychological construct of cognitive dissonance in economic modeling. First introduced by Akerlof and Dickens (1982), the construct has attracted the interest of economists of varying persuasions.2 The present paper attempts to synthesize some of the ideas introduced by recent research in the fields of decision science and management, which are related to the behavioral phenomenon

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1For a general statement about behavioral economics, as well as a state of the art review, see Gilad, Kaish and Loeb (1984).

2The recent annual meeting of the American Economic Association (1984) included a session on the application of cognitive dissonance to economic theory. The papers delivered ranged from application to microeconomics, history of economic thought, to the economics of crime. Another application can be found in a paper by Kunreuther (in Gilad and Kaish, in press).

captured by cognitive dissonance theory. The paper then relates these new developments to the basic utility maximization framework by sketching a general descriptive 'model' of a modified utility function.

The first section of the paper offers a theoretical background from which the new framework will be developed (or onto which the new ideas fit). The second section introduces the general framework of cognitive dissonance and utility maximization. The third and fourth sections then speculate on possible applications and generalizations of the modified approach to utility maximization.

2. The grand landscape: The trapped economic man

The most serious obstacle to the study of actual behavior seen by economists is that any behavior which is not fully rational must be random and therefore not a subject of scientific research. However, recent developments in the behavioral sciences suggest the existence of a continuum of qualitatively distinct states of partial rationality, or systematic irrationality.

The recent, and by now famous studies by the psychologists Daniel Kahneman and Amos Tversky and their colleagues (1979, 1982) are an excellent example of studying the systematic irrationality of people. Their findings of cognitive simplification processes (i.e., the use of heuristics and biases in decision making) are the material of which generative principles can be made. Additional research along these lines is being produced by management theorists such as Fox (1981), Fox and Staw (1979), Staw (1981), Kozielecki (1981) and Schwenk (1984) to name only a few.

The above research on decision making can be divided (with admittedly some damage done to it) into two broad categories: (1) what information is 'allowed' in the decision making process, and (2) what is done to the information once it is 'in'. Under the first category, which is the main interest of this paper, there are at least three behavioral processes which operate to restrict the amount of information that is allowed as input to the decision making. These are: prior hypothesis bias, adjustment and anchoring, and a process related to escalating commitment. [See Schwenk (1984) for an excellent review of the literature regarding these cognitive processes.]

Prior hypothesis bias is the case where a prior belief regarding the state of the world leads to ignoring disconfirming information. In the second process, adjustment and anchoring, initial estimates serve as an anchor, making consequent adjustments too small in light of new information that requires revisions in the original estimate. Thus in this case, the decision maker does not make full use of all available information. The third phenomenon involves the inappropriate discounting of negative information regarding a prior commitment to a course of action (e.g., a project) and the resultant continuation or even escalation of that commitment.
The underlying characteristic of all three cognitive mechanisms is the 'irrational' effect (at least from an economic perspective) of past behaviors (decisions, commitments, actions) on present behaviors. The finding of such an influence of the past led Fox and Staw to label their decision maker 'The Trapped Administrator'.

This recent evidence on the less-than-full use of available information is a rather latecomer in the journey to the limits on rationality. Back in 1957, Leon Festinger discovered the phenomenon of cognitive dissonance and its effect on the processing of available information. It is an interesting historical fact that of all the findings psychologists have made regarding the biasing effect of past cognitions on later behavior, it was cognitive dissonance that was picked up by economists. Perhaps the pervasiveness of the phenomenon in the daily life of individuals (including, alas, economists...) and the extensive research on it (more than 900 studies as of 1982) made it more accessible to economists than the more recent research. For the purpose of future research, however, economists should keep in mind that cognitive dissonance is only one of several cognitive processes preventing the traditional maximization of utility, or what neoclassical economists identify as full rationality, through their effect on the recognition and use of pertinent information. Incorporating the more recent research as well should serve to deflect possible criticism of concentrating on one narrow psychological process.

2.1. The postulates of the theory

In developing our descriptive model of cognitive dissonance (now serving as a catch-all name) and utility maximization, we have made use of the following basic postulates of the psychological theory (Wicklund and Brehm, 1976):

(a) Having cognitions that are inconsistent tends to create, under certain conditions – to be specified shortly – a state of cognitive dissonance. (Example: Having the cognition A and not B, if one already holds that if A than B.)
(b) Dissonance is an unpleasant state, motivating an attempt to reduce it.
(c) Dissonance reduction takes the form of changing dissonant cognitions. Since cognitions differ in their resistance to change, reduction of dissonance involves changing the least resistant cognition(s).

Additional assumptions of the theory which are needed for the economic model are related to the conditions under which a dissonance will actually
arise. The arousal of cognitive dissonance depends upon:

(d) The existence of a commitment (to a course of action). Commitment creates ego-involvement for the decision maker, i.e., he or she cannot deny the significance of their behavior to the occurrence of subsequent events. A commitment becomes the anchor, viz. the cognition most resistant to change. Dissonance reduction will therefore occur by changing cognitions inconsistent with the original commitment.

(e) The perception of responsibility for the dissonance by the decision maker. Responsibility in this context is defined as having two components: a free choice and the foreseeability of possible adverse consequences to the commitment.

To sum up the conditions for cognitive dissonance: If a commitment is undertaken freely and with the understanding of possible adverse outcomes, the stage is set for the setting of cognitive dissonance. The dissonance will then be a direct function of the quality and quantity of dissonant information (e.g., information about adverse outcomes). If behavior is performed under coercion, however, or if consequences are a complete shock to the decision maker, no cognitive dissonance will arise.

The last two assumptions pertain to the mode of dissonance reduction:

(f) One form of dissonance reduction is selective exposure. Selective exposure refers to the ‘avoidance’ of (either in the form of ignoring, or discounting the value of) dissonant information, and the ‘approach’ or seeking of confirming information.

(g) Selective exposure is not a monotonically increasing function of dissonance. Rather, as Frey (1982) showed, the relationship is curvilinear: At low levels of dissonance, selective exposure filters out dissonant information, but when the dissonance grows too large, the blocking off of information reverses itself and the initial decision is revised in line with the external evidence.

Current thinking holds that simply having two dissonant cognitions is not a sufficient condition for the arousal of cognitive dissonance. The sufficient conditions specified in this paper, as well as the previous assumptions are based on Wicklund and Brehm (1976).

The concentration of this paper on this assumption regarding the mode of dissonance reduction sets it apart from the pioneering approach of Akerlof and Dickens (1982). In their article, the authors make use of another form of dissonance reduction, the reevaluation of beliefs or attitudes toward the chosen course of action. In this particular mode, once a commitment is made, the decision maker shifts his attitude favorably toward the choice so that it is now perceived as even more desirable than before, and the rejected alternative as even less desirable. This form of dissonance reduction does not involve any active behavior toward external information. See Wicklund and Brehm (1976, p. 171).

Frey (1982) describes the behavior of subjects who had to make a series of decisions in a gambling situation: 'The study shows that the subjects' preference for information consonant with a decision was greatest when they had neither won nor lost a large amount of money as a
2.2. Empirical evidence

All the empirical evidence regarding selective exposure is the result of laboratory experiments. A typical experiment is the one conducted by Brock and Ballown [1967, cited in Wicklund and Brehm (1976)]. In that experiment, the researchers gave a group of smokers and non-smokers dissonant and consonant information about smoking, in the form of taped messages. The messages were accompanied by static noise which could be removed by pushing a button repeatedly. After carefully controlling for curiosity, intellectual honesty, usefulness of the information and other confounding effects, and using the number of static-removing button pushes as a measure of exposure to the message, the researchers found that non-smokers ‘cleared’ more smoking-causes-cancer type messages, while smokers ‘cleared’ more of the opposite messages.6

3. Cognitive dissonance and utility maximization: The general framework

All traditional optimization models in economics involve two components: choice variables and exogenous parameters. A change in behavior is brought about by a change in the optimal solution to the choice variable(s). This latter change, in turn, is brought about by a change in the exogenous parameters. But how is that change in the exogenous parameters (i.e., environmental data) to be perceived by the optimizing decision maker? According to neoclassical theory, the process of fully realizing the change is instantaneous. Moreover, the decision maker makes full use of the information regarding the change in resolving the optimization model.

Our first assumption is that in real life a change in behavior, i.e., a change in the level of the choice variable, is brought about because of surprise.

\[
S_t = \hat{O}_t - U_t, \tag{1}
\]

where \(\hat{O}_t\) is expected utility, \(U_t\) is experienced utility, \(S_t\) is level of surprise.

result of this decision. This pattern of findings holds both for the number of consonant pieces of information chosen and for the difference in rated desirability of reading consonant and dissonant communications. Subjects who won a lot did not experience much dissonance and thus were relatively indifferent to consonant as opposed to dissonant information, selecting it at a level roughly equal to chance. However, subjects who lost a large amount of money by the end of the 12th trial may have experienced such high dissonance that they reduced it, not by selectively searching for consonant information, but by subjectively revising their original decision. It was different with those subjects who had neither won nor lost a great deal of money. Their gains or losses were not so high that a revision of their initial decisions was justified. They kept their initial decision and tried to justify it by selectively seeking consonant information. (p. 1181, emphasis added.)

6For a review of the empirical evidence, as well as the limitation of the existing experiments, see Wicklund and Brehm (1976), Frey (1982), and Aronson (1979).
The notation and terms in eq. (1) are taken from Cohen and Axelrod (1984). In their pioneering article, Cohen and Axelrod introduced the modeling of surprise to drive a model of an adaptive change in preference. In the present model, surprise is used to drive an updating mechanism for the parametric data in the optimization model employed by the decision maker. In both cases, surprise is defined as the discrepancy between the utility one expected to experience due to the adoption of a particular course of action (or the undertaking of a particular commitment) and the actual utility associated with outcomes in reality. Note that in our modeling, a positive level of $S_t$ is associated with a negative surprise.

Our second assumption is that because of cognitive dissonance, the updating of the parametric components of the optimization model based on changes in exogenous conditions is imperfect. Specifically, the updating will not take place as long as the discrepancy between expectation and reality ($S_t$) is below a certain threshold level $k$. As the discrepancy exceeds that threshold, i.e., as the difference between the old solution to the model and the new one required by the new external conditions becomes too large to ignore ($S_t > k$), updating of the model will take place and the new solution (behavior) emerges.7

Our third assumption is that any level of surprise or discrepancy, subject to the conditions set forth in postulates (d) and (e) in section 2, will arouse cognitive dissonance $D_t$.

$$D_t = f(S_t),$$

where $f' > 0$ and for $S_t > k, D_t > k$.

Our fourth assumption is that the existence of cognitive dissonance activates an information filter, $F_1$. The operation of the filter is governed by the following specification:

$$F_1 = 0 \text{ if } 0 < D_t \leq k,$$

$$F_1 = 1 \text{ if } D_t > k.$$ (3)

According to eq. (3) as long as the dissonance is smaller than a threshold, $k$, the filter 'blocks out' dissonant information from influencing the parameters in the decision model. In other words, the individual is avoiding or discounting unsupportive information regarding his current behavioral commitment.

Finally, to make the model operational, we assume that $k$, the threshold

7This is different from assuming non-Bayesian or other updating biases. Here we assume that the updating is simply not performed, due to blocking out of dissonance information.
variable is a choice variable in the utility function, along with the more traditional arguments.

\[ U_i = g(..., k). \] (4)

It is easy to see that a maximizing individual should set the level of \( k \) so as to balance the expected cost of continuing to block dissonant information (e.g., monetary loss) with the expected benefits in terms of self-image (or the avoidance of the mental cost) associated with not admitting that the original commitment was wrong. As long as the benefits exceed the cost, the information filter should stay closed. When the expected cost is larger than the benefits (viz., when the surprise is too large to ignore) the information filter will open, causing a revision in the parameters of the decision model and as a result, in the original commitment.

Individual differences in the setting of \( k \) can be related to a (innate?) degree of tolerance toward dissonance [see Barron (1963), and Maital (1984) for some evidence on this point] where a higher degree contributes to a more adaptive, or profitable behavior. Other conceivable factors are environmental: the organizational insistence on justifying commitments, the extent of internal rivalry, or the tolerance of errors of judgement. These factors affect the costs and benefits associated with selective exposure and thus the setting of \( k \).

4. Some applications

The model we have developed leads to behavior that is somewhat different from that predicted by conventional theory. In the standard theory, the search for information is optimized and all the relevant information is fully weighted in the decision about how much to search. Suboptimal decisions are therefore the result of faulty information not faulty processing. In our model, cognitive dissonance blocks out information that economists consider relevant and distorts perception of much that it allows in. In the standard theory decisions are made in terms of marginal considerations only. Under cognitive dissonance, commitments already made are harder to reverse than they were to make. Thus, discontinuities or gaps are introduced into the traditional curves of optimizing decision processes.

Certainly, one may argue that there is nothing terribly novel in the notion of economic decisions that are not readily reversed. Transactions cost

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8The modeling of \( k \) as a 'choice variable' does not necessarily imply that it is a conscious choice; all one can say within this model is that optimal behavior will result from a \( k \) 'set' to balance expected cost and benefit. This is true for cognitive dissonance situations and for all other situations falling under the classification of 'in need for justification'. See Earl (1982, ch. 7) and Fox (1981) for a discussion of such situations.
explanations are well accepted as causes of imperfect adjustments of price and output called for by perfect markets. Stigler (1961) pointed out that information is only acquired at a cost and will not be acted on unless marginal benefits exceed that cost. Williamson (1981) and the modern institutionalists hold that the corporation internalizes functions when the cost of effecting routine transactions in the market exceeds the efficiency gained. Okun (1981) explains asymmetries in the hiring and firing of workers by the costs of recruiting and training. The literature on menu costs explains delays by firms in posting price changes. Information and administrative costs account for the relative infrequency of price adjustment [see, e.g., Barrow (1972), Sheshinski and Weiss (1977)]. Closer to the behavioral economic spirit, Leibenstein (1976) analyzes the impact of 'inert areas' on economic behavior. Here too such areas arise because the gains to be realized from change do not offset the disutility of making the change.

The difference between the theory of discontinuities outlined in this paper and the others just cited inheres in the use of information. Gaps occur in standard economic theory when an optimal decision has been made, following full information processing, that the marginal cost of action probably exceeds the benefits. Under cognitive dissonance there is no close evaluation of second order derivatives because the incremental information is not allowed in. Thus the gaps are not the result of a rational processing of information but of a psychological filtering system. In this section we consider implications of the model in three areas: sunk costs, the Phillips curve and investment decisions.

4.1. Sunk costs

Formal economic analysis ignores sunk costs since decision making should be carried out in terms of opportunities now present. Whatever led to the current state of affairs is history and of no consequence to current decisions. On the other hand, our model suggests that sunk costs do matter.

We have seen that commitment is the key to cognitive dissonance and the resultant blocking of information. We believe that sunk costs is the economic manifestation of commitment. When a decision is made to introduce a new product, acquire a new subsidiary, buy a stock, or take a job, and action based on the decision is taken, a commitment is made. The expenditure involved instantly becomes sunk costs. This commitment, under certain circumstances discussed earlier, blocks possible negative evidence regarding the wisdom of the course of action. This is the essence of the 'escalating commitment' paradigm of Barry Staw (1981) in which subjects were found to escalate investment and become locked into a losing course of action as a result of the need to justify prior investment in that course of action. The need to justify past actions (termed by Staw 'retrospective rationality') affected their search, use and interpretation of negative evidence. Scherer's
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(1984) finding that poorly performing business acquisitions are often not divested until the senior executive responsible for the acquisition leaves the firm, again suggests the biasing effect of strongly held beliefs due to past commitment on the use of contrary information in arriving at important decisions such as divestiture. Elsewhere we have examined how the behavior and public statements made by the managements of Atari and Continental Illinois while their corporations were failing fit into this sunk cost, cognitive dissonance paradigm [Gilad, Kaish and Loeb (1985)].

The business cycle is essentially a macroeconomic outcome of the same process. Some rational expectation theorists, advancing the island hypothesis, claim that market information signaling increased nominal demand is misperceived by suppliers as indicating increased relative real demand. Investment based on these false signals constitutes the boom phase. The end of the boom comes with the realization that the market will not sustain increased real supplies; that the higher demand was the result of an inflationary bubble.

An interesting question which arises is how can businessmen, as a group, ignore the information about inflation – information which is widely available and publicized?

Psychological literature can provide some explanation, as it deals with the group phenomena causing excessive optimism. [See Janis and Mann (1977, pp. 129–135) on Group-Think.] Certainly the knowledge that everyone is expanding and everyone is prospering creates a cognition that is dissonant with information that would lead the investor to suspect the surge in demand wasn't real or sustainable. The gap in information processing allows the expansion to continue. Haberler quotes Lavington's allegorical description of skating pond, for example:

‘Indeed, the confidence of each skater in his own safety is likely to be reinforced rather than diminished by the presence of numbers of his fellows ... The rational judgement that the greater their numbers the greater will be the risk is likely to be submerged by the mere contagion of confidence which persuades him that the greater the numbers the more safely he himself may venture.' [Haberler (1958, p. 147).]

Our model suggests an additional element: Businessmen develop a commitment to the expansion as is manifested by the sunk cost of capacity expansion. The result reinforces the filtering of warning signals brought about by the group dynamics.

4.2. The Phillips curve

Friedman's presidential speech (1968) changed our perception of the Phillips curve. He pointed out that the so called trade-off depended on
workers accepting a lower wage of which they were unaware. As they become aware, the curve shifts. Here too is a gap between information and action. The question is how can the gap persist. Rationally, workers have every opportunity to become aware of rising prices from their personal experiences. Many economists are reluctant to base a theory on worker ignorance. An alternative hypothesis that avoids the need to explain worker ignorance of falling real wages holds that they are aware of rising prices but are unable to do anything about them. It may be because union contracts are long lived or because as Okun says, the menu costs of reformulating the written and unwritten rules of the game are too great. He suggests that ‘the gap between the perceived secular and adapted rate is closed only gradually over the years and perhaps decades even when nobody is fooled by inflation’ [Okun (1981, p. 302)].

Our model is relevant to both hypotheses but in different ways. If one accepts Friedman’s hypothesis, our model may be used to explain how workers, having entered into an agreement, are resistant to information that tells them it was not a good one. The negotiation and ratification effort is a sunk cost. Cognitive dissonance may keep them resistant to the knowledge that inflation has wiped out their increase as long as it is easier to deny it than change the decision. Ultimately, if the weight of the evidence becomes too great, the information filter opens, higher wages are sought, and the short run Phillips curve shifts.

On the other hand, if there is awareness of the secular rise in prices but inability to adjust to it due to institutional constraints, we may well ask why government hasn’t been more active in encouraging indexing of wages and purchase contracts. With the exception of social security and some government pensions, fully indexed contracts in the U.S. are the exception rather than the rule. One possible explanation is based on the recognition that indexing represents the failure of demand management policies. The theory of cognitive dissonance suggests that if policy makers are sufficiently committed to demand management policies to control macroeconomic activity, they may resist information that indexing is needed. Since it is inconsistent to adopt indexation as national policy while still believing that inflation is controllable, the conflict may be solved by filtering dissonant information. Given sufficiently protracted severe inflation, however, the path to reducing this dissonance may well be through acknowledging the need for more widespread indexing.

4.3. Stock market investment

The current dominant theory of stock market behavior is the efficient

9See Janis and Mann (1977, ch. 5) for some evidence on the tendency of policy makers to ignore contrary information.
market hypothesis (EMH). In its weak and semi-strong forms, the two most widely supported versions of the hypothesis, the theory postulates the rapid incorporation of all publicly available information in the prices of stocks. The result is a prediction that attempts to earn excess return (i.e., to 'beat the market') based on a history of prices and volume or other public information are doomed to failure. The evidence in favor of the EMH is strong and is principally based on correlating movements of stock prices over time.

The EMH, however, 'explains' the behavior of the market as a whole, not the behavior of individual investors. Since the marginal rational traders are sufficient to bring about the apparent efficiency of the market as a whole, the irrational behavior of many (the majority?) of individual investors is left outside the scope of economic theory. For economists who believe that economic theory should address itself to the behavior of markets only, there is no harm done in ignoring the irrational behavior. Others believe that economic theory should attempt to develop a micro-macro explanation as well [see Leibenstein (1979)].

The kinds of irrational behavior we refer to are several:

1. There are the famous 'bubbles' – speculative periods in which particular stock prices were pushed to extreme highs, far beyond their underlying economic values. During these periods, which may be as long as years, crowd behavior or mob mania characterizes the behavior of numerous investors who disregard all evidence of excessive risk, history of bubble eruptions or cautious economic analysis. [See Dreman (1977).]

2. Professional investors and managers of investment funds consistently ignore evidence that 'beating the market' is impossible and may produce losses, and instead engage in overly aggressive trading. One particular example cited in Dreman (p. 156-157) is that of money managers who very aggressively invested in 'concept stocks' during 1971 although few months earlier, in 1969-1970 such stocks had shown disastrous results after an earlier mania in the go-go markets of 1967-1968.

3. There is still widespread use of technical analysis (reading the charts) in which experts in stock trading follow charts of stock-volume movements in order to identify trends that can be exploited for excess return. Despite all the evidence in favor of the weak form efficiency of the stock market (i.e., the randomness of stock price movements), war rooms full of charts are still popular [see Dreman (1977, chs. 2 and 3, Elton and Gruber (1981, p. 363))].

Recently, Shiller (1984) has advanced a somewhat similar argument about the role of psychology in the stock market. Shiller, however, used his argument to explain why stock prices show gross excess volatility relative to what is expected under the efficient market hypothesis (EMH). Our application of psychology pertains to the micro-macro explanation of investors' behavior and therefore remains valid regardless of the outcome of the debate between Shiller and his critics [see Kleidon (1985)] regarding the validity of the EMH.
All of these examples can be explained in our model as the result of previous ego-involving-commitments. From prestige for the professional manager, livelihood for the technical analyst to large financial stakes for the small investor, the particular investment strategy becomes a strong belief, resistant to change. Contrary information about the market or returns will arouse dissonance. To reduce dissonance the filter will be applied, blocking off or diminishing the importance of dissonant information.11

5. Summary

A whole new light is being shed on some aspects of the human decision making process by behavioral scientists. The new findings can augment the more restricted model of the economist. Our simple, descriptive model is far from being complete. Its only aim is to begin the process of modeling more complex behaviors which are difficult to interpret within a more narrow neoclassical approach. The particular psychological dimension that we have chosen to add to economic theory may not be the most important one. We chose to concentrate on one particular aspect of human information processing, viz., information filtering. Many other systematic irrationalities (in the economist sense of the word) may have fruitful implications for the economic model of man.

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